Remedial Design and Implementation Plan
Former ORP / Building 1 Area
Former Oakland Army Base - EDC Area
Oakland, California

Prepared for

Oakland Base Reuse Authority

Prepared by

Erler & Kalinowski, Inc.

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REMEDIAL DESIGN AND IMPLEMENTATION PLAN

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ABRREVIATIONS AND ACRONYMS

Amendment No. 1	Amendment to the LDR Variance, entitled *Amendment 1, Site-Specific Treatment Variance From Land Disposal Restriction Treatment Standards for Hazardous Wastes 40 CFR § 268.44(h).* prepared by U.S. EPA, dated 30 June 2003.
Army	United States Department of Defense, Department of the Army
ASTDR	United States Public Health Service, Agency for Toxic Substances and Disease Registry
ASTM	American Society of Testing and Materials
ATS	Alternative Treatment Standard for Building 1 Remediation Waste as specified in the U.S. EPA Land Disposal Restrictions Variance
BAAQMD	Bay Area Air Quality Management District
Building 1 Remediation Waste	hazardous remediation wastes at the Site with elevated lead concentrations and/or low pH leading to designation as D008 and/or D002 RCRA characteristic hazardous waste
Cal-EPA	California Environmental Protection Agency
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CIH	Certified Industrial Hygienist
Client Representative	engineer providing construction observation services on behalf of OBRA
COC	chemical of concern
Contract Documents	agreement between OBRA and its selected remediation contractor that includes the General Conditions, Technical Specifications and Construction Drawings that define the Work, and all addenda or change orders executed pursuant to the Contract Documents

ABRREVIATIONS AND ACRONYMS

Contractor	licensed remediation contractor selected by OBRA to implement the remedial construction work
CSM	conceptual site model
DOT	Department of Transportation
DTSC	Department of Toxic Substances Control, California Environmental Protection Agency
EDC	Economic Development Conveyance
EKI	Erler & Kalinowski, Inc.
ESCA	Environmental Services Cooperative Agreement
FOSET	Finding of Suitability for Early Transfer
ft bgs	feet below ground surface
H&SP	health and safety plan
LDR	land disposal restriction
LDR Variance	*Notification of Decision to Approve a Site-Specific Treatment Variance From Land Disposal Restriction Treatment Standards for Hazardous Wastes 40 CFR § 268.44(h).* prepared by U.S. EPA, dated 27 September 2002.
Limits of Work	the boundaries of the Site
mg/kg	milligram per kilogram
mg/L	milligram per liter
MRL	Minimum Risk Level
OARB	Oakland Army Base
OBRA	Oakland Base Reuse Authority
OEHHA	Office of Environmental Health Hazard Assessment

ABRREVIATIONS AND ACRONYMS

off-Site	any area outside the Limits of Work of the Former ORP / Building 1 Area .i.e. the "Site" subject to this RDIP.
Organic Residue	an organic material generated by the former oil reclaiming plant that operated at the Site from the 1920s until 1941 and any inseparably commingled soil. Organic Residue has low pH, elevated total and leachable lead concentrations, with potentially underlying hazardous constituents. Organic Residue may appear in a variety of forms including as a spongy, black, tarry material.
ORP	oil reclaiming plant
Overburden	fill material imported by the Army found directly beneath the asphalt and concrete cover materials to a depth of approximately three to five feet below ground surface. The Overburden soil consists of yellowish-brown, dry, sandy clay with gravel, and occasional boulders up to approximately one foot in diameter. The Overburden is generally free of stains, discolorations, oily sheens, noticeable solvent-like or petroleum hydrocarbon odors, or other obvious signs of chemical impact.
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
PCDD	polychlorinated dibenzodioxin
PCDF	polychlorinated dibenzofuran
ppbv	part per billion by volume
QAPP	Quality Assurance Program Plan
QA/QC	quality assurance / quality control

REMEDIAL DESIGN AND IMPLEMENTATION PLAN

Former ORP / Building 1 Area
Former Oakland Army Base - EDC Area, Oakland, California

ABRREVIATIONS AND ACRONYMS

RAP / RMP	*Final Remedial Action Plan and appended Risk Management Plan, Oakland Army Base, Oakland, California,* dated 27 September 2002, prepared by Erler & Kalinowski, Inc.
RCRA	Resource Conservation and Recovery Act
RDIP	Remedial Design and Implementation Plan
REL	Reference Exposure Limit
Remediation Goal	Numerical criteria for soil and groundwater as specified in the RAP / RMP
Site	area of environmental remediation activities at the Former ORP / Building 1 Area
Stained and Oily Soil	soil found at the Site that is stained a dark gray to black color, has a strong hydrocarbon odor, and appears shiny and oily, but does not have a spongy consistency or low pH.
SW 846	U.S. EPA *Test Methods for Evaluating Solid Waste*
SWPPP	Storm Water Pollution Prevention Plan
TCLP	Toxicity Characteristic Leaching Procedure
TEPH	total extractable petroleum hydrocarbons
TPH	total petroleum hydrocarbons
TPHd	TPH quantified as diesel
TPHmo	TPH quantified as motor oil
TPPH	total purgeable petroleum hydrocarbon
TRPH	total recoverable petroleum hydrocarbons
µg/dl	microgram per deciliter

ABRREVIATIONS AND ACRONYMS

µg/kg	microgram per kilogram
µg/L	microgram per liter
$\mu g/m^3$	microgram per cubic meter
UHC	underlying hazardous constituent
U.S.EPA	United States Environmental Protection Agency
USA	Underground Services Alert
VOC	volatile organic compound
WET	Waste Extraction Test
Work	environmental remediation activities at the Site defined in the Contract Documents

1. INTRODUCTION

On behalf of Oakland Base Reuse Authority ("OBRA"), Erler & Kalinowski, Inc. ("EKI") prepared this Draft Remedial Design and Implementation Plan ("RDIP") for the Former Oil Reclaiming Plant ("ORP") / Building 1 Area (the "Site") at the Former Oakland Army Base – Economic Development Conveyance ("EDC") Area, in Oakland, California (Figure 1). This Draft RDIP was prepared pursuant to Section 3.7 of the Consent Agreement between OBRA and State of California Environmental Protection Agency, Department of Toxic Substances Control ("DTSC"). The environmental remediation activities described in this RDIP were identified in the DTSC-approved Remedial Action Plan and appended Risk Management Plan ("RAP / RMP") (EKI, 2002a).

This RDIP provides an overview of the environmental remediation activities at the Site and copies of required project-specific plans and submittals that have been prepared by the licensed remediation contractor selected by OBRA to implement the environmental remediation activities ("Contractor") and by the engineer providing construction observation services on behalf of OBRA ("Client Representative").

In accordance with the RAP / RMP, unique protocols for implementation of the approved remedial action have been developed specifically for the Site, one of seven identified RAP sites within the Former Oakland Army Base – EDC Area. In addition, some risk management protocols, developed in the RAP / RMP, for RMP locations, have been incorporated into this RDIP and have been modified where deemed appropriate for use during remedial activities. Upon completion of the approved remedial action, the Site will then be subject to all of the RMP protocols established in the RMP. As stated on page 2-3 of the Final RMP, Section 2.2.1 – RAP Sites, "The seven RAP sites are contained within the RMP Implementation Area and will be subject to all risk management protocols set forth in [the] RMP once remedial actions have been completed."

Pursuant to California Health and Safety Code §25174.7, the City of Oakland is exempt from land disposal fees and hazardous waste generator fees. Any hazardous wastes that result from environmental remediation activities at the Former ORP / Building 1 area are "hazardous wastes which result when a government agency, or its contractor, removes or remedies a release of hazardous waste in the state caused by another person." The City of Oakland recognizes that land disposal fees are typically collected by the disposal facility on behalf of the State of California, and these fees are included in the estimates provided to generators and contractors for disposal of hazardous waste. However, for purposes of this Project, the City is exempt from these fees. The City of Oakland will

provide a letter certifying remediation of contamination caused by others, which is provided as an attachment in the Contract Documents for Former ORP / Building 1 Area, Former Oakland Army Base - EDC Area, Oakland, California ("Contract Documents") (EKI, 2005).

1.1 BACKGROUND

Portions of the Former Oakland Army Base, including the Site, were transferred to OBRA by the United States Department of Defense, Department of the Army ("Army") by an EDC on 8 August 2003. The property transferred by EDC is referred to as the Former Oakland Army Base - EDC Area. The early transfer required that both the State of California and the Army find that all required remediation will be undertaken after transfer ("Finding of Suitability for Early Transfer" or "FOSET"). OBRA and DTSC prepared the RAP / RMP (EKI, 2002a) that sets forth the remediation program to be implemented at the Former Oakland Army Base - EDC Area, including the Site, to satisfy applicable state and federal requirements consistent with the FOSET. The RAP / RMP was approved by DTSC on 27 September 2002.

1.1.1 Site Use History

An oil reclaiming plant ("ORP") was operated at the Site from approximately the mid- to late-1920s to 1941. The former ORP consisted of buildings, aboveground tanks, and other structures at the approximate locations shown on Figure 2. The former ORP used an acid clay oil re-refining process, which generated acid sludge and spent clay contaminated with petroleum residuals and metals. For at least some portion of the period that the ORP operated, the acid sludge[1], spent clay, and other oily wastes were apparently disposed in an area north and adjacent to the former ORP (Figure 2), identified as a "dump" on an historic map (Port of Oakland, 1938). When the Army acquired the land in 1941, the waste materials disposed in the "dump" were apparently covered with approximately three feet of imported fill to allow construction of Building 1, which was used by the Army as a headquarters building. The Army demolished Building 1 in December 2002. Subsurface investigations by the Army and OBRA have found that a layer of spongy, black, tarry, organic material ("Organic Residue") and other oily wastes are present in the subsurface under portions of former Building 1, particularly Wings 1 and 2.

[1] The acid sludge at ORPs typically possesses 2 to 10 percent lead, has a low pH, and contains polymerized petroleum hydrocarbons as well as significant percentages of oil lost as drag out (Arthur D. Little, Inc., 2001).

1.1.2 Summary of Remedial Action Plan

The DTSC-approved remedial action in the RAP / RMP for the Site is to excavate the Organic Residue, reduce the mobility of lead and other underlying hazardous constituents, and neutralize the acid, as needed in the material with lime, fly ash, or other appropriate binders. The addition of lime, fly ash, or other appropriate binders will aid in stabilizing high concentrations of lead that are often found in the Organic Residue.

The RAP / RMP assumed that the stabilized waste material would be disposed as a Resource Conservation and Recovery Act ("RCRA") hazardous waste at an off-Site permitted RCRA Subtitle C waste management facility. However, as discussed below, if the treated waste material can be treated on-site to remove the RCRA characteristic hazardous waste designation, it may be possible to prepare a waste profile and to dispose of the treated waste as non-RCRA hazardous waste, in accordance with the selected disposal facility's permit and waste acceptance criteria.

To minimize the amount of material that must be treated and disposed off-Site, effort will be made to segregate the yellowish-brown, dry, sandy clay with gravel fill soil imported that overlies the Organic Residue (the "Overburden") from the underlying Organic Residue. In accordance with the RAP / RMP, the Overburden will be reused as fill soil only if testing in accordance with the RAP / RMP indicates that it does not contain chemicals of concern ("COCs") greater than Site-specific numerical criteria for soil as specified in the RAP / RMP ("Remediation Goals"). Five years of groundwater monitoring following soil excavation is included in the remedial action approved for the Site.

1.1.3 Requirements of Land Disposal Restriction Variance

The DTSC-approved remedial action for the Site required a variance from U.S. EPA land disposal restriction ("LDR") treatment standards for the Organic Residue, some portion of which is expected to be a RCRA hazardous waste when excavated, and is referred to herein as "Building 1 Remediation Waste." The Army submitted an application for a Site-specific variance from RCRA LDR treatment standards pursuant to 40 CFR § 268.44(h) for Building 1 Remediation Waste at the Site (Army, 2002) (the "Petition"). Building 1 Remediation Waste is Organic Residue or other materials that have elevated lead concentrations and/or low pH leading to designation as D008 and/or D002 RCRA hazardous waste, as well as potentially containing underlying hazardous constituents ("UHCs") such as certain PAHs and dioxin-like compounds.

U.S. EPA approved the Army's Petition for an LDR Variance for a Site-specific alternative treatment standard, contingent upon completion of a treatability study on the expected Building 1 Remediation Waste (U.S. EPA, 2002a). The treatability study, completed by OBRA in early 2003, consisted of bench-scale testing of several additive mixtures from three different vendors experienced in solidification / stabilization technology for comparable wastes. Following planning, completion, and documentation of treatability studies on Building 1 Remediation Waste by OBRA on behalf of the Army (EKI, 2002b, 2003a, 2003b), U.S. EPA issued Amendment No. 1 to the LDR Variance (U.S. EPA, 2003), which approved an Alternative Treatment Standard ("ATS") for the Building 1 Remediation Waste based on the results of the treatability study. Solidification / stabilization technology will be applied to Building 1 Remediation Waste to reduce the mobility of lead and other underlying hazardous constituents and neutralize the acid in Building 1 Remediation Waste.

The U.S. EPA-approved Site-specific ATS, as established by U.S. EPA in Amendment No. 1 (U.S. EPA, 2003), applicable to Building 1 Remediation Waste is the following:

- attain 77% reduction in leachable lead, capped by a result of 5 mg/L (or less), as measured by the Toxicity Characteristic Leaching Procedure ("TCLP");
- neutralize the waste to a pH greater than 4; and
- decrease the percent moisture to less than 50% by weight.

In addition, any selected off-Site disposal facility may also specify any other appropriate waste acceptance tests in accordance with its operating permit, e.g., flammability screen, water compatibility, oxidizer screen, cyanide screen, and sulfide screen tests. The Contractor proposing any specific off-Site disposal facility will be responsible for treating the Building 1 Remediation Waste generated at the Site to comply with any and all such disposal facility-specific waste acceptance criteria, and all costs for such waste treatment and handling prior to off-Site disposal will be included as part of any pricing submitted with the Contractor's bid.

1.2 CONCEPTUAL SITE MODEL

Analytical results and information obtained from the pre-design investigation and previous investigations and research efforts by OBRA and the Army are summarized in Appendices B and C. This information was used to formulate the conceptual site model ("CSM") for the former ORP / Building 1 Area.

1.2.1 Physical Setting

The Site is relatively flat, varying by only a few feet in elevation across the Site.

1.2.1.1 Shallow Geologic Conditions

Soil beneath the current surface of the Site consists of approximately 2 to 4 feet of Overburden, underlain by a mixture of oily waste and Organic Residue to the north of the former ORP varying in thickness from a few inches to approximately 2 feet, and up to 4 feet of dark gray to black colored stained, shiny and oily soil ("Stained and Oily Soil") that was most likely the original ground surface directly beneath and south of the former ORP structures. Underlying the Organic Residue is the former surface of the mud flats, consisting of a mixture of clayey sediments, i.e., bay mud, dispersed with occasionally sandy sediments. Underlying the Stained and Oily Soil directly beneath the former ORP structures is what appears to be mostly hydraulic sandy fill material likely disposed to help create the former land surface for an island that supported the former ORP and other surrounding historic structures. A layer of bay mud appears to extend beneath the entire Site to a depth of at least forty feet below ground surface ("ft bgs").

1.2.1.2 Shallow Hydrogeologic Conditions

Shallow groundwater is first encountered at the Site at a depth of approximately 4 to 5 ft bgs. Portions of the Organic Residue are encountered within the shallow water-bearing zone. Groundwater flow direction in the shallow water-bearing zone is predominantly toward San Francisco Bay, i.e., toward the west (IT, 2002). Hydrogeologic studies conducted at the former OARB on behalf of the Army (Kleinfelder, 1998b) stated that tidal influence in the shallow water-bearing zone extended approximately 600 feet inland from the OARB Inner Harbor, indicating that tidal influences are unlikely to extend to the former ORP / Building 1 Area which is approximately 1,000 feet inland from the Inner Harbor. The bay mud acts as an aquitard beneath the shallow-water bearing zone, inhibiting the downward movement of shallow groundwater to deeper aquifers.

1.2.2 Environmental Conditions Relevant to Planned Remedial Actions

1.2.2.1 Organic Residue

A layer of Organic Residue with thickness varying from a few inches to approximately two feet is found to the north of the former ORP across a former wooden bulkhead. The Organic Residue has been found to contain COCs above Remediation Goals and, once excavated, some portion will be considered Building 1 Remediation Waste. Additionally,

the Organic Residue contains underlying hazardous constituents such as PAHs and dioxin-like compounds. The high concentrations of leachable lead are most likely attributable to the extremely low pH, which solublizes the lead that is present in the waste. Based on available data, the Organic Residue is considered to be a principal threat waste and is targeted for remediation at the Site. The concept of principal threat waste is discussed in greater detail in Section 8.1 of the RAP (EKI, 2002a).

Based on color and consistency, the layer of Organic Residue can be visually identified during excavation and is generally separable from the Overburden, underlying clayey and sandy sediments, and other chemically-impacted soil that is not Organic Residue. Observations and analytical data collected during field investigation activities conducted on behalf of OBRA and the Army were used to estimate the location of the layer of Organic Residue as shown on Figure 3. This layer of potential Building 1 Remediation Waste will be excavated, treated, and disposed off-Site in accordance with the Contract Documents (EKI, 2005).

1.2.2.2 Stained and Oily Soil

In addition to the Organic Residue, a layer of visually impacted soil containing COCs such as TPH and lead, referred to as "Stained and Oily Soil," is found beneath the former ORP structures and is adjacent to the area where Organic Residue was identified. The thickness of the Stained and Oily Soil varies from a few inches to approximately 4 feet. Only a portion of the Stained and Oily Soil appears to be contaminated with COCs at concentrations greater than Remediation Goals. Based on available data, such Stained and Oily Soil is not a RCRA characteristic hazardous waste. The pH of the Stained and Oily Soil is closer to neutral. A larger portion of the Stained and Oily Soil contains COCs at measurable concentrations, but which are less than Remediation Goals.

Observations and analytical data collected during field investigation activities conducted on behalf of OBRA and the Army were used to estimate the lateral and vertical extent of Stained and Oily Soil containing COCs greater than Remediation Goals, where located adjacent to the Organic Residue, as shown on Figure 3. This layer of Stained and Oily Soil found adjacent to the Organic Residue, and which exceeds Remediation Goals, will be excavated and disposed off-Site in accordance with the Contract Documents (EKI, 2005)..

1.2.2.3 Overburden

Fill soil was imported by the Army in 1941 and was placed on top of the Organic Residue and Stained and Oily Soil to raise the grade of the Site for the construction of Building 1.

Based on the analytical data collected on behalf of OBRA and the Army, Overburden does not appear to contain COCs at concentrations greater than Remediation Goals. Once tested during environmental remediation activities, the excavated Overburden can likely be reused on-site to backfill the excavation.

Generally, the boundary between the Overburden and the underlying Organic Residue or Stained and Oily Soil is clearly discernable, both visually and based on the analytical data. These observations were used to estimate the vertical extent of excavation intended to remove the Overburden within the area where Organic Residue or Stained and Oily Soil is present, as shown on Figure 3. Some trenches were observed where Overburden appeared to contain small amounts of Organic Residue and Stained and Oily Soil. Such mixing of Overburden with contaminated materials probably occurred along former utility corridors and other locations where soil disturbances were likely to have occurred during past construction activities, or where liquid portions of the Organic Residue were observed to move to the surface, i.e., as found adjacent to one of the piles beneath former Wing 1 of Building 1. The occasional mixing of Organic Residue and Stained and Oily Soil with the Overburden will require that the Contractor segregate, separately stockpile, and then test the visually "clean" Overburden soil from other Overburden that appears to be impacted as indicated in the Contract Documents (EKI, 2005), or as otherwise directed by the Client Representative based on field observations.

1.2.2.4 Underlying Clayey and Sandy Sediments

A layer of clayey and occasionally sandy sediments underlying the Organic Residue and Stained and Oily Soil is easily distinguished from contaminated materials above by both color and consistency. This clayey material is believed to be the former, native shoreline sediments or bay mud, on which the Organic Residue and Overburden fill soils were placed historically. Chemical impacts to this underlying layer from overlying contaminated materials have been found to be minimal; no chemicals were detected in the clayey and sandy sediment samples at concentrations that are indicative of source soils or principal threat wastes, or that are greater than Remediation Goals that would require removal in accordance with the RAP / RMP.

Observations of clayey and sandy sediments and analytical data collected on behalf of OBRA and the Army were used to estimate the lower vertical boundary of the Base Case Excavation as shown on the Construction Drawings. During the removal of Organic Residue, the Contractor will excavate to the depth indicated on the Construction Drawings, or as otherwise directed by the Client Representative based on visual observance of this underlying layer by the Client Representative, in accordance with the Contract Documents (EKI, 2005)..

1.2.2.5 Shallow Groundwater

On the basis of groundwater sampling in the Building 1 area, the low pH groundwater does not appear to extend horizontally beyond the areas where Organic Residue is present beneath the groundwater table. The available groundwater pH data (Table 1) indicate that low pH groundwater does not extend beyond the limits of the planned Base Case Excavation limits. No volatile or semi-volatile COCs were detected above Remediation Goals in groundwater samples collected by the Army in the vicinity of the Site (IT, 2002). As described in Section 7.3.2.2 of the RAP (EKI, 2002a), Remediation Goals for non-volatile compounds were not calculated for groundwater because vapor intrusion is the only potentially complete exposure pathway for groundwater based on the future planned land uses. However, one of the general remedial action objectives is to prevent significant increases of concentrations of metals and other non-volatile COCs in groundwater. This goal will be achieved through removal of the Organic Residue and Stained and Oily Soil in areas where it extends into the shallow water-bearing zone. No active remediation of shallow groundwater is planned as part of the remedy for the Site selected in the RAP. Any dewatering conducted during remediation or future redevelopment at the Site will be subject to the pertinent requirements in the RMP.

2. PREPARATORY ACTIVITIES

2.1 SUBMITTAL OF PLANS

The Contractor and Client Representative selected by OBRA has prepared site-specific plans and submittals to assist in the management of the environmental remediation activities at the Site. The means, methods, and techniques that the Contractor will use to implement environmental remediation activities are identified in the final plans attached herein as Appendices D through L. The plans include: the Contractor's Site-Specific Health and Safety Plan, the Contractor's Task- Specific Health and Safety Plan – Utility Demolition, the Traffic Control and Transportation Plan, the Perimeter Air Monitoring Plan, the Decontamination Plan, the Storm Water Pollution Prevention Plan, the Dust and Odor Control Plan, and the Soil Treatment Process Plan. Copies of these final plans will be retained at the Site during performance of the environmental remediation activities.

2.2 PERMITS AND AGREEMENTS

The following is a table of potentially necessary permits, and the respective issuing agencies, that the Contractor may be required to obtain prior to initiating environmental remediation activities at the Site. The Contractor shall obtain all necessary permits for its performance of the Work.

Permit Issuing Agency	Type of Permit	Reason for Permit
City of Oakland - Community and Economic Development Agency	Curb, Gutter, Sidewalk, and Driveway Permit	Replacing curb, gutter, sidewalk, and roadway.
	Sewer Permit	Temporarily relocating and replacing sewer lines
	Excavation Permit	Excavating soil.
	Grading Permit	Changing grade and/or slope of the Site by removing or moving soil.
	Obstruction Permit	Staging construction equipment on streets and potential closing of Bataan Ave.
	Encroachment Permit	Constructing monitoring wells.
RWQCB	NPDES Permit	Potential discharging of groundwater into San Francisco Bay.

EBMUD	Sewer Discharge Permit	Potential discharging of groundwater to sanitary sewer.
SWRCB	Notice of Intent	Obtaining coverage under the SWRCB's General Permit for storm water discharge
RWQCB	Construction Storm Water Pollution Prevention Plan	Controlling storm water discharge from construction Site
Underground Services Alert	Excavation tag number for underground excavation	Locating underground utilities prior to excavation.

The following is a list of currently identified agreements that have been executed amongst various parties or that will likely be required for, or related to, the planned environmental remediation activities at the Site.

Organizations Involved	**Title of Agreement**	**Reason for Agreement**
DTSC and City of Oakland	DTSC/City Consent Agreement	Provides compliance elements, timetables, deliverables, reporting requirements, and land use restrictions
Army and OBRA	Environmental Services Cooperative Agreement ("ESCA")	Defines remediation responsibilities and protocols between OBRA and Army
Army and DTSC	Army / DTSC MOA	Defines DTSC oversight over remediation at the former Oakland Army Base
Port and City of Oakland	Port/City MOA	Defines remediation responsibilities and protocols between the Port and City
DTSC and OBRA	Remedial Action Plan	Defines the remediation program at the former Oakland Army Base
OBRA, Army, Insurer	Environmental Insurance Policy	Provides OBRA with Environmental Insurance for remediation costs above set limit and deductible; third party pollution legal liability coverage

U.S. EPA, OBRA, Army	U.S. EPA LDR Variance LDR Variance and Amendment No. 1	Provides a variance to Federal Land Disposal Restrictions for Building 1 Remediation Waste and specifies the Alternative Treatment Standard
Designated Off-Site Waste management facility(s)	Waste Profile Forms; LDR Notification Form	Provides documentation of acceptance of Building 1 Remediation Waste and other wastes

2.3 MOBILIZATION TO THE SITE

Following issuance of award of the Contract and initial notice to proceed from OBRA, and after the Contractor has prepared, submitted, and obtained all approvals from OBRA, Client Representative, and DTSC, where needed, of the plans described above in Section 2.1, the Contractor may conduct initial mobilization of equipment and materials that are needed for non-invasive activities, i.e., those preparatory activities that do not include exposing or handling of contaminated soil at the Site. The allowable activities include setting up field offices, constructing decontamination and dewatering pads, or other containment pads or support areas deemed necessary by the Contractor under the Contract Documents (EKI, 2005)., coordinating access to utilities to be utilized by Contractor at the Site (such as power, telephone, and water), preparing dust and odor control measures and supplies, non-invasive preparations for permanent or temporary relocation of utilities and roadways, and other non-invasive pre-excavation activities approved by OBRA.

Full-scale environmental remediation activities at the Site by the Contractor, as described in the following Section 3, and mobilization of construction equipment and personnel needed to implement the Work will begin only after all of the following have occurred and have been confirmed in writing:

- OBRA and the Client Representative favorably review the Contractor's Project Schedule[2];
- OBRA, the Client Representative, and DTSC favorably review the Contractor's Decontamination Plan, Dust and Odor Control Plan, Perimeter Air Monitoring Plan, Storm Water Pollution Prevention Plan, and Treatment Process Plan;

[2] As a contractual requirement, one of the initial submittals that the Contractor will be required to provide is an overall project schedule and basis for progress payments, as specified in the Contract Documents (EKI, 2005).

- DTSC favorably reviews the Final RDIP
- DTSC favorably reviews the Contractor's Traffic Control and Transportation Plan
- DTSC favorably reviews the Contractor's Health and Safety Plan;
- DTSC favorably reviews the Client Representative's Health and Safety Plan;
- Contractor obtains all necessary permits and files any necessary notices with regulatory agencies; and
- Issuance of a notice to proceed with full-scale environmental remediation activities from OBRA.

3. REMEDIATION ACTIVITIES

3.1 ENVIRONMENTAL REMEDIATION EQUIPMENT AND METHODS

The specific equipment means and methods that will be utilized for environmental remediation activities at the Site will be selected at the discretion of the Contractor. Environmental remediation activities will generally include excavating, treating, testing, transporting, and disposing Building 1 Remediation Waste and other contaminated soil. The Work can generally be accomplished with standard earthwork equipment for excavating, backfilling, soil additive mixing, and loading of soil. Additional environmental remediation activities will likely include temporarily storing decontamination water; backfilling, compacting, and repaving excavated areas; and capping and re-routing or replacing utilities.

The following table provides a brief description of the types of equipment that will likely be used to implement the anticipated environmental remediation activities:

Category	Equipment	Purpose
Earthwork	Excavator	Excavate soil
	Backhoe	Excavate soil, trench for utility work
	Bulldozer	Move excavated soil and debris, backfill excavations
	Compactor	Spread and compact backfill materials
Treatment of Building 1 Remediation Waste	Pug mill or other mixing device	Mix chemical reagents with excavated Building 1 Remediation Waste
	Conveyor belts	Aid in stockpiling excavated soil and transporting small quantities of soil around the Site
	Power generator	Supply power to pug mill, mixer, conveyor belts, and other electrical equipment
	Power screen	Separate excavated soil by size
Excavation Support	Sheeting and shoring	Support excavation sidewall
	Crane	Lift and place sheeting and shoring
Soil and Waste Removal	Dump truck	Move excavated soil, concrete, asphalt, or Building 1 Remediation Waste
	Wheel loader	Move and stockpile excavated soil and concrete
Miscellaneous	Paving equipment	Repave excavated areas
	Water truck	Supply water for dust control
Decontamination	Pressure washer and steam cleaner	Wash soil, and Building 1 Remediation Waste from equipment

3.2 EXTENT OF EXCAVATION

The Contractor will remove existing asphalt, concrete, subsurface structures, and debris within the excavation area before excavating the Overburden, Organic Residue, and Stained and Oily Soils. The areas of pavement, concrete, and asphalt to be removed by the Contractor are identified on Figure 4. To minimize the infiltration of rainwater, potential disturbance of Organic Residue and Stained and Oily Soil, and generation of dust, the existing asphalt and concrete paving covering the excavation area will be left in place until soil remediation begins or will be removed in phases as elected by Contractor.

The Base Case Excavation is shown on Figure 4. The Base Case Excavation is subdivided into Excavation Subareas, each with two specified excavation depths: (1) the first excavation depth corresponds to the approximate expected bottom of visually non-impacted Overburden to be excavated, segregated, and temporarily stockpiled on-site and potentially reused to backfill the excavation following testing in accordance with the Contract Documents (EKI, 2005) and Section 7.4.2 of the RMP, as clarified in DTSC's letter entitled *Soil Reuse, Former Oakland Army Base – Economic Development Conveyance Area, Oakland, California,* dated 24 December 2004 and (2) the second excavation depth corresponds to the expected bottom of the visually identifiable layer of Organic Residue or the layer of Stained and Oily Soil that is expected to contain COCs at concentrations that exceed Remediation Goals based on prior sampling and laboratory analyses. The specified horizontal and vertical limits of the Base Case Excavation encompass the previous sampling locations by the Army and OBRA (including the pre-design investigations as summarized in Appendix C) where Building 1 Remediation Waste or Stained and Oily Soil samples were found to contain COCs above Remediation Goals in either the unsaturated or saturated zones (see Section 1.2). For purposes of estimating the volumes of Organic Residue or Stained and Oily Soil in each Excavation Subarea, as shown on Figure 3, the material to be removed in the second layer of each Subarea is identified as containing primarily either Organic Residue or Stained and Oily Soil. The Contractor will segregate and stockpile the materials actually encountered in accordance with the Contract Documents (EKI, 2005), or as otherwise directed by the Client Representative in the field.

The final lateral and vertical limits of excavation and volumes of excavated materials will be determined in the field during excavation activities by the Contractor in accordance with the Contract Documents (EKI, 2005), or as otherwise determined by the Client Representative based on visual observations and the results of confirmation soil sampling as discussed in Section 3.4. Descriptions of the overburden, organic residue, stained and

oily soil, and underlying clayey and sandy sediments as described in OBRA's Treatability Test Field Activities Report dated 22 July 2003, are as follows:

- Overburden: The overburden soil consists of yellowish brown, dry, sandy clay with gravel and occasional boulders up to approximately 1 foot in diameter. The overburden soil encountered in all the trenches during the Treatability Test performed in January 2003, was free of stains, discolorations, oily sheens, noticeable solvent-like or petroleum hydrocarbon odors, or other obvious signs of chemical impacts. The overburden layer is believed to be fill material imported by the Army prior to beginning construction of Building 1 in September 1941. Generally, the interface between the overburden soil and the material encountered beneath it was sharp and easily distinguishable, with very little smearing between the zones. The overburden soil was generally mechanically separable from the organic residue, stained and oily soil, and the clay and sand layer, i.e., the organic residue could be separated from the overburden using the backhoe bucket without significant mixing of the layers.

- Organic Residue: The organic residue was black in color and had a noticeable petroleum hydrocarbon odor and, to differing degrees, appeared to be oily in nature. The groundwater encountered beneath or with the residue often had a visible sheen and was oily in appearance with several quarter-sized drops of a reddish brown oily liquid present on the groundwater surface. No appreciable amount of liquid-like, flowable, free hydrocarbon product was observed to be commingled, or present above or below, the organic residue. Where the residue was present below the water table and was saturated, it was soft, pliable, and spongy-textured, and the residue was easily broken apart by hand with minimal effort. The residue was light weight and appeared to be highly porous; when it was gently squeezed by hand, a fair amount of liquid, presumably water, would seep out from the residue. Where the residue was present above the water table, it was dry, harder and more difficult to break and squeeze by hand. With some effort, it could be cut with a knife or the edge of a shovel.

  Based on the trenching locations where organic residue was observed by EKI in January 2003, and observations by the Army's consultants during previous investigations (IT, 2002), the organic residue appears to be located primarily on the north side of the historic wooden bulkhead associated with the former ORP and to extend laterally in the northern direction under former Wings 1 and 2 of Building 1 in a semi-circular shape (see Figure 2). This area north of the wooden bulkhead where organic residue is present corresponds to the location labeled as "dump" on an historical map of the former ORP (Port of Oakland, 1938).

- Stained and Oily Soil: The stained and oily soil encountered during the Treatability Test varied in thickness from a few inches to 3 feet thick. This soil was stained a dark gray to black color, had a strong hydrocarbon odor, and appeared to be shiny and oily. In one trench OBRA-T13, a small amount of groundwater mixed with oily-appearing, thick, viscous, black liquid oozed from the sidewall of the trench at approximately 5.5 ft bgs. Groundwater encountered beneath the stained and oily soil had a visible sheen and was oily in appearance.

  Based on the trenching locations where stained and oily soil was observed by EKI in January 2003, and observations by the Army's consultants during previous investigations (IT, 2002), the stained and oily soil appears to be located primarily on the south side of the historic wooden bulkhead associated with the former ORP and to extend laterally south of the bulkhead in a semi-circular shape (see Figure 2). This area south of the wooden bulkhead where stained and oily soil is present corresponds to the location where the former ORP facility and above ground tanks were located.

- Clayey and Sandy Sediments: Beneath the organic residue and stained and oily soil, primarily on the northern portion of the former ORP / Building 1 Area, a soft, greenish gray, saturated clay interbedded with sand stringers is present. On the southern portion of the area, a fine to medium grained, olive gray sand underlies the organic residue and stained and oily soil. Shell fragments were frequently present in the sand and clay. Occasionally, the sand and clay were found to have a hydrogen sulfide odor. Remains of plant debris were frequently found at the interface with organic residue and stained and oily soil. In some of the locations, it was difficult to discern the sand and clay layer from the overlying organic residue using the backhoe. However, clay or sand that was free of organic residue was encountered at the base of each of the trenches.

The Base Case Excavation will be to the limits shown on Figure 3. The lateral and vertical extents of the excavation may be altered, i.e., expanded or reduced, as directed by Client Representative on the basis of observations in the field as excavation proceeds and confirmation sampling results as they become available. The Client Representative will observe the excavation activities and will direct the Contractor to excavate beyond the Base Case Excavation shown on Figure 3, if a) additional Organic Residue is visibly identified along the sidewalls or bottom of the excavation, or b) sidewall confirmation soil sampling results indicate locations where Remediation Goals are exceeded and further excavation is practicable.

The Contractor will stop excavating soil before reaching the Base Case Excavation limits shown on the construction drawings, if no Organic Residue or otherwise visually impacted soil is present along the sidewalls or bottom of the excavation, or as otherwise directed by the Client Representative. This protocol for early termination of excavation in any portion of the planned excavation only applies when approved by Client Representative based on review of available sampling data and field observations; the Contractor will not be allowed to leave Building 1 Remediation Waste or Stained and Oily Soil in place within the Base Case Excavation limits shown on the construction drawings where available sampling data or other observations confirm that it is present, except in consultation with DTSC to allow for inaccessible areas where excavation could endanger structures or utilities that cannot be relocated. If results from previous investigations indicate that Organic Residue or visually impacted soil containing COCs above Remediation Goals is present beyond or outside the Contractor's current excavation point, the Client Representative will direct the Contractor to continue excavating soil until those previously identified contaminated locations have been removed. Deviations from the Base Case Excavation limits shown in the Contract Documents (EKI, 2005) will occur by field memoranda issued by the Client Representative, which will summarize the observed conditions or other basis for the change and the estimated increase or decrease in the Base Case Excavation limits.

Creosote treated piles, formerly part of the Building 1 foundation, were cut at the ground surface by the Army when Building 1 was demolished. Approximately 82 of these piles on approximately 20 foot centers are believed to be present within the Base Case Excavation limits and are expected to extend below the bottom of the excavation. During the excavation activities, the Contractor will cut off the piles at the bottom of the excavation and temporarily place the cut-off piles on-site in a segregated debris pile for characterization, waste profiling, and subsequent off-Site disposal at an appropriately permitted disposal facility.

3.3 MANAGEMENT AND TESTING OF STOCKPILES

Initially, Overburden, Organic Residue, and Stained and Oily Soil will be segregated and stockpiled separately by the Contractor at the Site in accordance with the Contract Documents (EKI, 2005), or as otherwise directed by Client Representative based on visual observations during excavation. In accordance with Section 7.4.2 of the RMP, individual stockpiles will not exceed 200 cubic yards, unless the Contractor demarcates individual stockpiles into 200 cubic yard segments that can be characterized, tracked, and handled separately without significant mixing with the adjacent segments, e.g., by placing 10-mil black plastic sheeting between each 200 cubic yard segment. In accordance with the RMP, such stockpiles will rest upon, at minimum, one layer of 10-

mil black plastic sheeting, and will be covered, at minimum, by one layer of 10-mil black plastic sheeting at all times except when the material is being handled. All stockpiles will be clearly demarcated, tracked, and labeled by the Contractor to correspond with representative samples submitted for laboratory analyses.

The Contractor will minimize the volume of excavated clayey and sandy sediments that are removed from the excavation from native materials below the Organic Residue or Stained and Oily Soil. Any excavated clayey and sandy sediments that are inadvertently removed from the excavation will be segregated by the Contractor and stockpiled separately and managed by the Contractor in accordance with all Laws and Regulations.

In accordance with the Contract Documents (EKI, 2005), the Contractor will be required to keep written documentation and implement tracking procedures to track each stockpile or stockpile segment from initial excavation through off-Site disposal, or on-site reuse as backfill. Stockpiling procedures for the three main categories of excavated materials are described below.

3.3.1 Overburden

Individual stockpiles or stockpile segments of Overburden soil will not exceed 200 cubic yards. However, the Contractor will only collect and analyze one composite soil sample per 600 cubic yards of stockpiled Overburden. The composite sample will be comprised of three discrete samples, one each from three separate 200 cubic yard stockpiles or stockpile segments, and the composite sample will be analyzed for the list of COCs, as identified in the SAP (Appendix A). This sampling frequency is adequate to characterize the Overburden when used to augment existing Overburden environmental sampling data, as explained in more detail in Section 4.1.1 of the SAP (Appendix A).

In accordance with the soil reuse requirements in Section 7.4.2 of the RMP, as clarified in DTSC's letter entitled *Soil Reuse, Former Oakland Army Base – Economic Development Conveyance Area, Oakland, California,* dated 24 December 2004 the Client Representative will review the characterization data provided by the Contractor and will determine if each stockpile of Overburden is potentially acceptable for use as backfill in the excavation, or if it must be disposed off-Site. If needed, the Client Representative may also request that the Contractor analyze each discrete sample used to form the composite sample or additional representative samples to determine if each individual 200 cubic yard stockpile of Overburden is acceptable or unacceptable for reuse as backfill in the excavation. In addition to the RMP requirements for reuse, only Overburden soil suitable for reuse as backfill, in accordance with the geotechnical

requirements provided in the Contract Documents (EKI, 2005), will be used as backfill for the excavation (See Figure 8).

Any visually impacted Overburden (e.g., Overburden that appears to be mixed with portions of Organic Residue or Stained and Oily Soil), building piles, metal debris, concrete debris, or other types of debris encountered during excavation of the Overburden will be segregated, stockpiled, and characterized separately from visually unimpacted Overburden, or as otherwise directed by the Client Representative. The final disposition of such impacted overburden will be determined by the Contractor based on the characterization data, and will be approved by the Client Representative prior to disposal or reuse. Debris will be disposed (or recycled) off-Site at the lowest cost facility as approved by the Client Representative after review of the waste characterization data provided by the Contractor.

3.3.2 Stained and Oily Soil

In-situ analytical data collected previously by OBRA and the Army indicate that identified areas of Stained and Oily Soil contains TPHd, TPHmo, and lead, along with a few VOCs and SVOCs, at concentrations greater than Remediation Goals. These identified areas of Stained and Oily Soil found with COC concentrations greater than Remediation Goals are generally located adjacent to and south of the area of Organic Residue as shown on Figure 3, and are within the limits of the Base Case Excavation as shown on Figure 3, unless additional excavation is directed by Client Representative. Stained and Oily Soil that was found in prior investigations to have COC concentrations less than Remediation Goals is not included within the limits of the Base Case Excavation, except to the extent that pockets of relatively less contaminated or unimpacted soil may be encompassed by soil found to exceed Remediation Goals. Regarding the latter less contaminated or unimpacted soil, if encountered during the Base Case Excavation, the Client Representative can direct the Contractor to segregate and separately stockpile such soil for evaluation for on-site reuse as backfill following testing protocols for Overburden soil, as discussed in Section 4 of the SAP (Appendix A).

The Contractor will characterize each 200 cubic yard stockpile of Stained and Oily Soil for waste classification purposes and off-site disposal pursuant to Section 5 of the SAP (Appendix A). The Client Representative will review the waste characterization data provided by the Contractor and will approve the waste classification of each stockpile of Stained and Oily Soil recommended by the Contractor.

The initial analyses may indicate that a Stained and Oily Soil stockpile or other segregated, less impacted soil is determined to not require disposal at an off-site,

permitted disposal facility and is potentially acceptable for reuse on-site, e.g., based on the initial comparison of total metal and TPH concentrations to their respective Remediation Goals. Then the Client Representative will request the Contractor to perform any additionally required sampling and analysis of the Stained and Oily Soil stockpile or other segregated, less impacted soil in accordance with the soil reuse requirements described in Section 4 of the SAP for confirmation of Overburden soil for reuse as backfill material at the Site. Excavated Stained and Oily Soil or other segregated soil can be reused as backfill material only if it is acceptable for reuse in accordance with Section 7.4.2 of the RMP, as clarified in DTSC's letter entitled *Soil Reuse, Former Oakland Army Base – Economic Development Conveyance Area, Oakland California*, dated 24 December 2004. In addition to the RMP requirements for reuse, only Stained and Oily Soil that is found suitable for reuse as backfill in accordance with the geotechnical requirements provided in the Contract Documents (EKI, 2005) will be used as backfill for the excavation (See Figure 8).

Any building foundation piles, metal debris, concrete debris, or other types of debris encountered during excavation of the Stained and Oily Soil will be segregated and stockpiled separately from Stained and Oily Soil. Each type of debris will be disposed (or recycled) off-Site at the lowest cost facility as approved by the Client Representative after review of the waste characterization data provided by the Contractor.

3.3.3 Organic Residue

The Contractor will sample and analyze each 200 cubic yard stockpile of Organic Residue pursuant to Section 4.1 of the SAP (Appendix A), or as otherwise specified in the DTSC approved Soil Treatment Process Plan (Appendix L). Based on the waste characterization data provided by the Contractor, the Client Representative will determine if each sampled 200 cubic yard stockpile of Organic Residue is Building 1 Remediation Waste requiring on-site treatment prior to off-Site disposal (See Figure 8). Organic Residue stockpiles or stockpile segments that are not Building 1 Remediation Waste will be managed and sampled pursuant to the same protocols as Stained and Oily Soil described above in Section 3.3.2 and in the SAP (Appendix A).

Any building foundation piles, metal debris, concrete debris, or other types of debris encountered during excavation of the Organic Residue will be segregated and stockpiled separately from Organic Residue. Each type of debris will be disposed (or recycled) off-Site at the lowest cost facility as approved by the Client Representative after review of the waste characterization data provided by the Contractor.

3.4 CONFIRMATION SOIL SAMPLING

The Contractor will be responsible for collecting confirmation soil samples in accordance with the SAP (Appendix A). In accordance with the Contract Documents (EKI, 2005), a California registered geologist or professional civil engineer, or an appropriately trained geologist or engineer working under the supervision of one of these registered professionals, will collect all required confirmation soil samples in accordance with the SAP (Appendix A) and the Contract Documents (EKI, 2005). If needed, the Contractor will retain a subconsultant to provide professional sample collection services and to coordinate laboratory analyses. As specified in the Contract Documents (EKI, 2005), confirmation soil samples will be analyzed by a California certified analytical laboratory. Upon receipt of laboratory analyses, the Contractor will provide copies of the results and appropriate information or sketches defining sample locations to Client Representative for review and concurrence.

The Client Representative in the field will intermittently observe confirmation soil sample collection activities by the Contractor or its subconsultant to determine if samples are being collected in accordance with the SAP and Contract Documents (EKI, 2005). The Client Representative will document and notify the Contractor of noted deviations from the sample collection procedures specified in the SAP and the Contract Documents (EKI, 2005), if necessary. The Contractor will immediately correct sampling deviations noted by the Client Representative.

Upon receipt of final certified laboratory results, the Contractor will provide the confirmation soil sample results, in the formats specified in the Contract Documents (EKI, 2005) for electronic data deliverables and hard copy, to the Client Representative for review and concurrence prior to terminating excavation at any location and prior to backfilling any portion of the excavation.

3.4.1 Lateral Extent of Excavation

Once the limits of the excavation are reached either to the Base Case Excavation limits shown on the construction drawings, or to other limits determined by the Client Representative in the field, the Contractor or its subconsultant will collect confirmation soil samples from the sidewalls of the excavation. The confirmation soil samples will be used to verify that individual and cumulative soil Remediation Goals for residual COCs have been obtained at each sampling location along all the sidewalls of the excavation and determine if additional excavation is necessary to comply with the Remediation Goals. The sampling protocols, frequency, and laboratory analyses for confirmation soil samples are described in the SAP (Appendix A). If analytical results from confirmation

soil samples indicate that the concentration of any COC remaining within an excavation sidewall is above its Remediation Goal, additional excavation will be performed in the sample location as directed by the Client Representative. Upon acceptance of completion of excavation of the vertical and horizontal extent of the excavation by the Client Representative, the Contractor will survey the vertical and horizontal locations of the final confirmation sample location(s) and then backfill the excavation in accordance with the Contract Documents (EKI, 2005).

3.4.2 Vertical Extent of Excavation

The planned vertical limits of the excavation are to the depth of the underlying clayey and sandy sediments as indicated on the construction drawings, or as necessary to remove observable deposits of the Organic Residue, i.e., potential Building 1 Remediation Waste. The Client Representative in the field will observe the progress of the Work by the Contractor to determine visually if the excavations to the depths specified on the construction drawings have resulted in removal of the Organic Residue. Once the excavation has proceeded through the Organic Residue layer to the specified minimum depths, observation of native clayey and sandy sediments that visually free of Organic Residue will be an adequate basis for the Client Representative to conclude that no further vertical excavation is needed at that location. Such observations of native clayey and sandy sediments following removal of visually contaminated layers may be made by the Client Representative by observation of material in the excavator bucket, even if obtained below standing water.

Twenty-three (23) samples of clayey and sandy sediments were collected by OBRA during the treatability study in January 2003 and by the Army during previous investigations. The analytical results for clayey and sandy sediments obtained during these investigations are included in Table 5. The analytical results indicate that no COCs are present in these sediments at concentrations that exceed Remediation Goals. These data indicate that potential impacts from overlying Organic Residue and Stained and Oily Soil are minimal within these native sediments; no chemicals were detected in the clayey and sandy sediment samples at concentrations that are indicative of source soils or significant threat wastes that would require removal in accordance with the RAP / RMP. For this reason, if possible, only six bottom confirmation soil samples will be collected during environmental remediation activities in areas where groundwater has not filled the bottom of the excavation.[3] The six bottom confirmation soil samples will be collected in areas of the excavation where the prior in-situ data are less frequent and spaced farther apart (see Figure 2).

3.5 WATER MANAGEMENT

During the course of the excavation the Contractor is required to manage all water including groundwater, entrained groundwater released from excavated soil, and precipitation.

3.5.1 Control of Water from Excavations and Soil Handling Areas

The project includes excavation of saturated soil that is below first encountered groundwater. The Contractor will need to control, handle, manage, contain, store, sample, treat (if necessary), and dispose of free water removed during excavation of soil in accordance with DTSC's letter Management of Water at Building 1 Excavation, Former Oakland Army Base – Economic Development Conveyance (EDC) Area, Oakland California dated 20 January 2005. The Contractor will implement appropriate measures to minimize the amount of excess water by utilizing wet excavation techniques. Wet excavation techniques may include (a) using excavator buckets with holes to allow excess water to drain from excavated Organic Residue when removed from within the shallow water-bearing zone, (b) moving groundwater from one portion of the excavation to another, (c) controlling excavation rate, timing, and sequencing, and (d) using shallow lined evaporation basins to store collected water at the Site. Reducing the amount of excess water contained within Organic Residue determined to be Building 1 Remediation Waste will enhance the Contractor's ability to handle, treat, and transport these excavated materials, as well as help achieve the waste management facility acceptance criterion of a moisture content of 50% or less, by weight (see Section 1.1.3). The Contract Documents (EKI, 2005) require that the Contractor make all appropriate efforts to minimize the moisture content of excavated soil and sediments and that all excess soil and all treated Building 1 Remediation Waste achieve a moisture content of 50% or less, by weight, prior to loading on transport vehicles for off-Site disposal. All water and saturated soil must be managed after removal from the excavation, e.g., prior to loading the excavated soil into vehicles for transport to stockpile areas or placing soils within temporary storage areas.

[3] During prior trenching activities for the treatability study and the pre-design investigations, groundwater rapidly infiltrated into the trenches. Bottom confirmation soil samples will be difficult to collect from below standing water that is expected to fill the bottom of the excavation.

3.5.2 Control of Water During Soil Treatment

The Contractor will construct a treatment pad, as specified in the Soil Treatment Process Plan (Appendix L), on-site at a location chosen by the Contractor within the fenced Limits of Work. The treatment pad will be specifically designed to prevent drainage water from infiltration to underlying soils and to control runoff. The treatment pad will be of sufficient size to contain the volume of expected Organic Residue estimated by the Contractor to require dewatering at any one time. The Contractor will pump all water with a portable pump into a water storage tank, and characterize and dispose of such water in accordance with Section 3.5.4 below.

3.5.3 Stormwater Management

The Contractor will collect and control rainfall runoff from stockpile, soil handling, and treatment areas and prevent run-on to these areas during rainfall events as described in the Storm Water Pollution Prevention Plan (Appendix H). The Contractor will also collect any water that contacts soil or falls as precipitation within these areas and will control, handle, manage, contain, store, sample, treat (if necessary), and dispose of such water. Collected free water, drainage water, groundwater from excavated soil, or runoff from soil handling areas may not be used for dust control, unless such use is specifically allowed in the DTSC approved Dust and Odor Control Plan (Appendix J).

3.5.4 Characterization and Disposal of Water

All water collected during remediation activities shall be characterized, profiled, and disposed in accordance with the applicable Laws and Regulations and permit conditions of the designated, permitted disposal facility. Water will be tested for VOCs, SVOCs, TPH, metals, pesticides, and PCBs in accordance with the RMP Section 6.1.2 and DTSC's letter entitled *Management of Water at Building 1 Excavation, Former Oakland Army Base – Economic Development Conveyance (EDC) Area, Oakland California* dated 20 January 2005. The Contractor plans for testing and disposing of water are included in Appendix L - Soil Treatment Process Plan.

3.6 TREATMENT OF BUILDING 1 REMEDIATION WASTE

In accordance with the Contract Documents (EKI, 2005), the Contractor will be responsible for preparing, submitting, and implementing a Soil Treatment Process Plan to describe the Contractor's proposed full-scale on-site treatment facilities and processes for Building 1 Remediation Waste (see Appendix L). DTSC must approve both the Soil Treatment Process Plan and the Final RDIP prior to any work at the Site that involves the

on-site treatment of impacted soils. The Contractor will also be responsible for collecting all environmental samples needed (1) to identify Building 1 Remediation Waste and (2) to verify achievement of the ATS in accordance with the LDR Variance and the SAP (Appendix A). The Contractor will provide the analytical results of each Treatment Batch to the Client Representative in the formats specified in the Contract Documents (EKI, 2005) for review and concurrence. In accordance with the Contract Documents (EKI, 2005), the Contractor will utilize the services of a California registered geologist or professional civil engineer, or an appropriately trained geologist or engineer working under the supervision of one of these registered professionals, to collect all required environmental samples in accordance with the SAP.

3.6.1 Identification of Building 1 Remediation Waste

Some of the Organic Residue removed during the excavation at the Site may not be Building 1 Remediation Waste as identified in the LDR Variance (U.S. EPA, 2002a). Initially, Organic Residue will be segregated and stockpiled separately from Overburden, Stained and Oily Soil, and segregated debris by the Contractor at the Site in accordance with Section 3.3. It will be necessary to test Organic Residue stockpiles to determine if it is Building 1 Remediation Waste, i.e., a D008 or D002 RCRA hazardous waste. This waste characterization testing must be completed before determining that such excavated material is Building 1 Remediation Waste that is subject to on-site treatment to attain the ATS specified in the LDR Variance and Amendment No. 1 and any disposal facility-specific waste acceptance criteria (see Section 1.1.3).

From each stockpile or stockpile segment of approximately 200 cubic yards of Organic Residue, the Contractor, or the Contractor's subconsultant, will collect and analyze one representative four-point composite sample in accordance with the SAP, or as otherwise specified in the DTSC approved Soil Treatment Process Plan (Appendix L). The Client Representative will review the analytical results and approve identification of each 200 cubic yard stockpile of Organic Residue that is Building 1 Remediation Waste based on the criteria in the LDR Variance (U.S. EPA, 2002a), i.e., material that displays the D008 toxicity characteristic for lead (TCLP lead greater than 5 mg/L) or material that displays the D002 corrosivity characteristic (pH less than 2).

If any other stockpiled material such as Overburden or Stained and Oily Soil is found to be RCRA hazardous waste, e.g., if the TCLP for lead is failed, such materials will also be managed as Building 1 Remediation Waste subject to the requirements of the LDR Variance. Once Organic Residue, or other stockpile material, is identified as Building 1 Remediation Waste, its final off-site disposal destination must be a RCRA Subtitle C permitted waste management facility, pursuant to the LDR Variance.

3.6.2 On-Site Treatment Operations

The Contractor will treat Building 1 Remediation Waste on-site in accordance with the Contractor's Soil Treatment Process Plan, favorably reviewed by OBRA and the Client Representative. Building 1 Remediation Waste will be treated to achieve the ATS specified in the LDR Variance and Amendment No. 1 and any required facility-specific waste acceptance criteria (U.S. EPA, 2002a; 2003). The results of bench-scale treatability studies conducted on behalf of OBRA (EKI, 2003a) indicate that there are several, non-proprietary reagents readily available to the Contractor, such as Type I Portland cement, cement kiln dust, and lime kiln dust, that are capable of achieving the ATS, as well as meeting typical waste management facility acceptance criteria. Two proprietary reagents, MAECTITE® and Enviroblend®, were also tested at various dosage rates in the treatability tests conducted on behalf of OBRA and were shown to be capable of achieving the ATS.

The Contractor will be responsible for selecting a treatment reagent, or a mix of reagents, capable of achieving the ATS. The initial dosage rates for the treatment reagent(s) selected and proposed by the Contractor will be approved by OBRA. If the Contractor proposes alternative dosage rates that are outside the range of dosage rates tested during the bench-scale treatability studies, the Contractor must provide suitable evidence supporting an alternative dosage.

The specific equipment, means, and methods used by the Contractor for mixing the selected reagents with untreated Building 1 Remediation Waste will be at the discretion of the Contractor and will be described in the Contractor's Soil Treatment Process Plan (Appendix L).

Performance of the Contractor's treatment process will be determined by measuring the concentration of TCLP lead, and pH, before and after applying treatment technology to the Building 1 Remediation Waste. However, in accordance with the LDR Variance, the Contractor may hold the pre-treatment waste sample and demonstrate by testing that the treated Building 1 Remediation Waste attains a TCLP result for lead of 5 mg/L or less, as well as other ATS and waste acceptance criteria; such treated Building 1 Remediation Waste will deemed to meet the ATS without analysis of the pre-treatment sample for determination of percentage reduction in lead TCLP results. Upon receipt of certified laboratory results, the Contractor will provide the batch-testing results to the Client Representative for review and concurrence prior to shipment of each batch of treated material from the Site to the selected RCRA Subtitle C disposal facility.

3.7 TRANSPORT AND DISPOSAL OF SOIL AND DEBRIS

The Contractor will be responsible for working with disposal facilities to characterize treated Building 1 Remediation Waste, Stained and Oily Soil, Overburden and debris for off-Site disposal, if needed, based on stockpile soil data, post-treatment soil data, or in-situ soil data, where applicable. The Contractor will provide laboratory analytical reports and proposed, completed waste profile forms and necessary waste manifests to OBRA and Client Representative for review and concurrence. Once acceptable, the waste profile forms and waste manifests will be signed by an OBRA representative. Figure 8 is a simplified flowchart that identifies the presumed most-likely disposal classifications for materials anticipated to be excavated from the Site.

Building 1 Remediation Waste, Stained and Oily Soil, Overburden, and debris from the Site will be classified for off-site disposal, if needed, based on sampling characteristics and transported to the waste management facilities in accordance with the minimum requirements specified in the Traffic Control and Transportation Plan (Appendix F).

Pursuant to California Health and Safety Code §25174.7, the City of Oakland is exempt from land disposal fees and hazardous waste generator fees. Any hazardous wastes that result from environmental remediation activities at the Former ORP / Building 1 area are "hazardous wastes which result when a government agency, or its contractor, removes or remedies a release of hazardous waste in the state caused by another person." The City of Oakland recognizes that land disposal fees are typically collected by the disposal facility on behalf of the State of California, and these fees are included in the estimates provided to generators and contractors for disposal of hazardous waste. However, for purposes of this Project, the City is exempt from these fees. The City of Oakland will provide a letter certifying remediation of contamination caused by others, which is provided as an attachment in the Contract Documents (EKI, 2005).

3.8 SITE RESTORATION

After confirmation soil sampling has verified that soil Remediation Goals have been attained at the limits of excavation, the excavation will be lined with filter fabric, backfilled, and compacted as specified in the Contract Documents (EKI, 2005). The shallow water-bearing zone within the excavation will be filled with crushed rock, and a layer of filter fabric placed on top of the crushed rock. The unsaturated zone will be backfilled with acceptable, excavated Overburden soil and import fill. Import fill material will be free of naturally occurring organic material, such as peat and vegetation, and will not contain COCs greater than the Remediation Goals and other limits specified

in the SAP (Appendix A). A schematic backfill section was included in the construction drawings (Sheet C-1) in the Contract Documents (EKI, 2005).

The Contractor will collect representative soil samples for chemical analysis from the stockpiled Overburden soil and from Contractor's proposed off-Site fill source in accordance with the SAP (see Appendix A). These samples will be analyzed for metals, volatile organic compounds, selected semivolatile organic compounds, dioxin-like compounds, and total petroleum hydrocarbons for comparison with the Remediation Goals and other requirements specified in the SAP and the Contract Documents (EKI, 2005). The Client Representative and OBRA's Site Civil Engineer will notify the Contractor of the suitability of stockpiled Overburden and designated import fill soil for use at the Site. The Contract Documents (EKI, 2005) will also specify other parameters for determining the acceptability of material proposed for backfilling at the Site, including, but not limited to, sizing and compaction requirements. It will be the responsibility of the Contractor to perform backfilling of all selected materials in conformance with the Contract Documents (EKI, 2005).

OBRA's Site Civil Engineer with arrange for geotechnical analyses needed to generate compaction curves and for in-place compaction testing that will be done during backfill operations. Import fill will, at a minimum, be compacted to 90% relative compaction, respectively, or as required by any grading or building permit obtained by the Contractor for the Work.

The final grading of the backfill and the Site will be accomplished in accordance with the specifications in the Contract Documents (EKI, 2005), as provided by OBRA's Site Civil Engineer. In the excavation areas, the backfill will bring the ground surface back to at least the pre-excavation elevation. The Site will then be graded and paved to direct storm water runoff to the existing or modified storm drains. Bataan Avenue will be restored to its pre-remediation alignment in accordance with the technical specifications and construction drawings in the Contract Documents (EKI, 2005).

4. QUALITY ASSURANCE PROJECT PLAN ADDENDUM

The Contractor and its subconsultants and subcontractors will follow the Quality Assurance / Quality Control ("QA/QC") protocols identified in the DTSC-approved *Site-wide Quality Assurance Program Plan, Former Oakland Army Base - EDC Area, Oakland, California* ("Site-wide QAPP"; Veridian, 2005), as amended by this Quality Assurance Project Plan Addendum ("QAPP Addendum"). Together, the Site-wide QAPP and the QAPP Addendum will cover all environmental sampling and analysis activities

related to the environmental remediation activities, conducted by the Contractor on behalf of OBRA at the Former ORP / Building 1 Area in accordance with the Contract Documents (EKI, 2005). Where applicable, this QAPP Addendum adopts the QA/QC protocols that were identified in the Site-wide QAPP. The Site-wide QAPP and this QAPP Addendum were prepared in accordance with U.S. EPA QAPP guidance documents, current as of December 2003 (U.S. EPA, 2001a; 2001b; 2002b).

Section A7 of the Site-wide QAPP requires that a QAPP Addendum be prepared for each RAP Site. The required elements of the QAPP Addendum are as follows:

- Element A5 - Problem Definition / Background;
- Element A7 - Quality Objectives and Criteria;
- Element B1 - Sampling Process Design;
- Element B2 - Sampling Methods;
- Element B3 - Sample Handling and Custody; and
- Element B4 - Analytical Methods.

Additionally, this QAPP Addendum includes modifications to the Element B5- Quality Control of the Site-wide QAPP, as they apply to Site-specific environmental sampling and analysis activities related to environmental remediation activities to be conducted at the Site.

4.1 ELEMENT A5 - PROBLEM DEFINITION / BACKGROUND

The Site background and a discussion of the environmental remediation activities and associated sampling and analysis to be implemented at the Site by the Contractor under the basewide QAPP and this QAPP Addendum are discussed in Sections 1 through 3 of this RDIP. The SAP is included as Appendix A. The Contractor who will conduct environmental remediation activities and associated sampling and analyses of environmental samples on behalf of OBRA, will follow the QA/QC protocols described in the Basewide QAPP (Veridian, 2005), except as modified herein.

4.2 ELEMENT A7 - QUALITY OBJECTIVES AND CRITERIA

As described by U.S. EPA (2002b), the Quality Objectives and Criteria section of the QAPP describes the quality specifications needed to support the qualitative and quantitative design of a data collection effort. The outputs of U.S. EPA's recommended data quality objective ("DQO") process are suited to addressing these needs. The DQO process, as described by U.S. EPA (1993), is a step-by-step procedure for:

- Developing qualitative and quantitative statements that clarify the field investigation objectives, and define appropriate types of data and conditions under which to collect these data; and

- Specifying acceptable levels of decision errors as the basis for establishing the quantity and quality of data needed to support project decisions.

U.S. EPA (1993) identifies seven steps in the DQO process to refine data requirements and to assist in collecting the data needed for decision making. Each of these steps is examined below as it relates to the environmental remediation activities.

4.2.1 Step 1: State the Problem

This is a description of the process, identified problems, and general schedule for the project.

The DTSC-approved remedial action for the Site is to excavate the Organic Residue, reduce the mobility of lead and other underlying hazardous constituents, and neutralize the acid, as needed, in the Building 1 Remediation Waste with lime, fly ash, or other appropriate binders. The environmental remediation activities proposed in this RDIP will enable the removal and treatment of Building 1 Remediation Waste and other contaminated soil to meet the Remediation Goals.

4.2.2 Step 2: Identify the Decision

This is a description of the key decisions to be made for the project and the actions that could result from these decisions.

The key decisions that will be made from the sampling and analysis activities conducted as part of the environmental remediation activities include the following:

(1) decide whether Overburden soil can be reused on-site,
(2) decide whether to excavate additional material along the sidewalls of the excavation to meet Remediation Goals or whether to terminate the excavation,
(3) identify Building 1 Remediation Waste for on-site treatment,
(4) verify achievement of the Alternative Treatment Standard for any identified Building 1 Remediation Waste following treatment and prior to off-Site disposal, and

(5) classify all other excavated soil and debris for disposal at appropriately permitted facilities acceptable to OBRA.
(6) decide whether import fill is acceptable to OBRA.

4.2.3 Step 3: Identify Inputs to the Decision

This is a description of the analysis that needs to be conducted and other information needed to make the decisions defined in Step 2.

The primary inputs to the decisions will be the analytical data collected as part of the sampling and analysis activities conducted on as part of the environmental remediation activities. Other inputs will include existing analytical data collected as part of previous investigations by the Army (see Section 1.2), the treatability test investigation conduct by EKI on behalf of OBRA (EKI, 2003b), and the pre-design investigation activities conducted by Ninyo & Moore on behalf of OBRA (see Appendices B and C), and observations by the Client Representative during the environmental remediation activities.

4.2.4 Step 4: Define the Boundaries of the Study

This is a description of the characteristics of the Site, the surrounding area, and practical considerations that will affect the decision defined in Step 2.

The boundaries of the study are delineated by the Limits of Work shown on Figure 3.

Environmental remediation activities and associated environmental sampling and analysis will likely be accomplished throughout the workday during the project duration, although inclement weather, or other unforeseen delays may temporarily halt work at the Site. It is not anticipated that varying the time of collection of samples, even over a period of a few months, will significantly affect the utility of the resulting analytical data.

4.2.5 Step 5: Development of Decision Rules

This step combines outputs from the previous steps into an "if...then..." statement that defines the conditions that may affect the final decision regarding remedial actions.

Conditions pertaining the six decisions identified in Section 4.2.2 are presented below.

4.2.5.1 Reuse of Overburden

Analytical results are needed to determine whether Overburden removed, segregated, and stockpiled at the Site can be reused on-site to backfill the excavation. The following conditions will guide reuse of Overburden:

- If analytical results of a representative sample of Overburden soil collected in accordance with the SAP indicate that a soil stockpile is acceptable for reuse in accordance with Section 7.4.2 of the RMP, as clarified in DTSC's letter entitled *Soil Reuse, Former Oakland Army Base – Economic Development Conveyance Area, Oakland California*, dated 24 December 2004, and COC concentrations do not exceed remediation goals established in the RAP, land disposal restrictions, and the California hazardous waste criteria, the soil may be reused on-site to backfill the excavation, provided the Overburden stockpile meets geotechnical requirements.

- If analytical results of a representative sample of Overburden soil collected in accordance with the SAP indicate that a soil stockpile contains any COC above individual or cumulative Remediation Goals, then the stockpile will be not be considered suitable for reuse at the Site, and will be disposed off-Site.

4.2.5.2 Additional Excavation

Once the initial extent of the excavation is reached, analytical results are needed to decide if additional excavation is necessary to attain the Remediation Goals in soils left in place at the excavation sidewalls. The following conditions will guide the need for additional excavation:

- If analytical results from confirmation soil samples collected in accordance with the SAP indicate that the concentration of all COCs remaining within an excavation sidewall are below individual or cumulative Remediation Goals, the excavation will be terminated at that sample location.

- If analytical results from confirmation soil samples collected in accordance with the SAP indicate that the concentration of any COC remaining within an excavation sidewall is above individual or cumulative Remediation Goals, additional lateral excavation will be performed in the sample location as directed by the Client Representative.

4.2.5.3 Identification of Building 1 Remediation Waste

Representative samples of excavated, segregated, and stockpiled Organic Residue will need to be collected to identify Building 1 Remediation Waste that is subject to on-site treatment to attain the ATS specified in the LDR Variance and any additional disposal facility-specific waste acceptance criteria (see Section 1.1.3). The following conditions will guide identification of Building 1 Remediation Waste:

- If analytical results of the representative sample collected in accordance with the SAP from a stockpile of Organic Residue indicates that the stockpiled material is not a RCRA hazardous waste, e.g., D008 or D002, then the stockpiled material will not be Building 1 Remediation Waste, and it will not be subject to on-site treatment. The stockpiled material will then be characterized as needed for off-Site disposal at an appropriately permitted facility acceptable to OBRA.

- If analytical results of the representative sample collected in accordance with the SAP from a stockpile of Organic Residue indicates that the stockpiled material is a RCRA hazardous waste, e.g., D008 or D002, then the stockpiled material will be managed as Building 1 Remediation Waste and will be subject to on-site treatment to attain the Alternative Treatment Standard specified in the LDR Variance and any facility-specific waste acceptance criteria.

4.2.5.4 Achievement of ATS

Representative samples of Building 1 Remediation Waste will be collected in accordance with the SAP from each Treatment Batch Volume prior to and after treatment to verify achievement of the Alternative Treatment Standard. The following conditions will guide verification of achieving the ATS:

- If analytical results of a representative sample collected from a Treatment Batch Volume of treated Building 1 Remediation Waste in accordance with the SAP indicates that the treated material is not a RCRA hazardous waste, i.e., does not exhibit D008 or D002 characteristics, the moisture content is less than 50% by weight, pH is greater than 4, and that other facility-specific waste acceptance criteria are met, then the particular Treatment Batch Volume will be determined to have achieved the ATS and will be disposed off-Site as a non-RCRA hazardous waste, or other lower-cost disposal classification if available, at a permitted RCRA Subtitle C waste management facility acceptable to OBRA.

- If analytical results of a representative sample collected from a Treatment Batch Volume of treated Building 1 Remediation Waste in accordance with the SAP indicates that the treated material is still a RCRA characteristic hazardous waste

due to leachable lead greater than 5 mg/L in the extract solution, i.e., still D008 waste, but the overall percent reduction in leachable lead is greater than or equal to 77% when compared with the TCLP result for the pre-treatment sample, and if all other ATS and waste acceptance criteria stated above have been met, then the particular Treatment Batch Volume will be determined to have achieved the ATS and will be disposed off-Site as a RCRA characteristic hazardous waste at a permitted RCRA Subtitle C waste management facility acceptable to OBRA.

- If analytical results of a representative sample collected from a Treatment Batch of treated Building 1 Remediation Waste in accordance with the SAP indicates that the treated material is still a RCRA hazardous waste due to leachable lead, i.e., D008, the percent reduction in leachable lead is less than 77%, or any other ATS or waste acceptance criteria stated above have not been met, then the particular Treatment Batch Volume will be re-treated and re-tested by the Contractor until the particular Treatment Batch Volume achieves the ATS and all other applicable waste acceptance criteria.

4.2.5.5 Classification of Soil and Debris for Disposal

Representative samples will be collected in accordance with the waste management facility disposal classification requirements from stockpiles designated for off-Site disposal, following the procedures described in the Soil Treatment Process Plan (Appendix L). The following decision rules will guide classification of these materials for purposes of off-Site disposal:

- If analytical results of representative samples indicate that excavated soil is a RCRA hazardous waste, then the soil will be identified as Building 1 Remediation Waste and will be treated to meet the ATS as described above.

- If analytical results of representative samples of debris, e.g., woodpiles, is a RCRA hazardous waste, then this debris will be disposed off-Site as RCRA hazardous waste at a permitted facility acceptable to OBRA.

- If analytical results of representative samples indicate that the excavated soil or debris, is a not a RCRA hazardous waste, then the material will be disposed off-Site as either non-hazardous waste or as California non-RCRA hazardous waste at permitted waste management facilities acceptable to OBRA.

4.2.5.6 Identification of Acceptable Import Fill

If needed, representative samples of proposed import fill material will be collected pursuant to the Contract Documents (EKI, 2005), based on the City of Oakland import fill specifications (City of Oakland, 2004). The following conditions will guide identification of acceptable fill:

- If analytical results of representative samples collected by the Contractor in accordance with the City of Oakland import fill specification, indicate that the proposed import fill is acceptable for reuse pursuant to the criteria described in the Contract Documents (EKI, 2005), i.e., the City of Oakland import fill specification, then the proposed import fill can be used to backfill the excavation, provided soil meets geotechnical requirements.

- If analytical results of representative samples indicate that import fill is not acceptable for reuse pursuant to the criteria described in the Contract Documents (EKI, 2005), i.e., the City of Oakland import fill specification, then the Contractor will be required to identify and test an alternate source of import material.

4.2.6 Step 6: Specify the Limits on Decision Errors

This section describes the acceptable decision error rates.

Decision errors occur when the sample data set misleads the project participants into making an incorrect decision and, therefore, taking the wrong response action. The possibility of decision errors exists because, in reality, decisions are based on sample data that are never perfect or complete. Many factors contribute to the overall error in any study; however, the two most predominant sources of error are in the sampling design and in the analytical measurements. Sampling design error is influenced by the inherent variability of the population over space and time, the sample collection design, and the total number of samples. Obviously, it is not possible to exhaustively sample and analyze an entire soil stockpile; thus, inherent variability may go undetected. Measurement and analytical error is influenced by imperfections in the measurement and analysis system, e.g., the analytical equipment and procedures used by the selected laboratory.

The first type of decision error that may result from errors in sampling design or analytical measurement is a false negative error. A false negative error occurs when sampling data misleads the project participants into believing that the burden of proof has not been satisfied so the null hypothesis, e.g., COC concentrations are greater than Remediation Goals, is not rejected when it should be rejected. The possible consequences of false negative errors include unnecessary expenditures for further remediation. Specific examples of false negative errors for the Site are as follows:

1. Deciding that Overburden is unsuitable for reuse, when, in fact, it does not contain COC concentrations greater than Remediation Goals.

2. Deciding that additional excavation is needed along the sidewalls of the excavation, when, in fact, the sidewall material does not contain COC concentrations greater than Remediation Goals.

3. Deciding that a stockpile of excavated Organic Residue or other material qualifies as Building 1 Remediation Waste, when, in fact, the material is not a RCRA hazardous waste and is thus not Building 1 Remediation Waste.

4. Deciding that a particular Treatment Batch Volume requires additional treatment because it did not meet the ATS, when, in fact, the material meets the ATS and could be disposed off-Site in accordance with the LDR Variance.

5. Deciding that stockpiled soil is a RCRA hazardous waste and requires treatment or disposal as a RCRA hazardous waste, when, in fact, the material is non-hazardous or non-RCRA hazardous waste.

6. Deciding that a proposed fill source is unacceptable, when, in fact, the material is acceptable for use at the Site.

The second type of decision error is a false positive error. A false positive error occurs when sampling data misleads the project participants into believing that the burden of proof has been satisfied so the null hypothesis, e.g., COC concentrations are greater than Remediation Goals, should be rejected, when it should not be rejected. A false positive error is the more "severe" decision error, thus, conservative decisions will be made to avoid false positive errors. Examples of false positive errors are as follows:

1. Deciding that Overburden is suitable for reuse, when, in fact, it contains COC concentrations greater than Remediation Goals.

2. Deciding that no additional excavation is needed along a particular sidewall, when, in fact, the sidewall material contains COC concentrations greater than Remediation Goals.

3. Deciding that a stockpile of excavated Organic Residue or other material is not RCRA hazardous waste, when, in fact, the material is a RCRA hazardous

waste and thus is Building 1 Remediation Waste and requires treatment prior to off-Site disposal.

4. Deciding that a particular Treatment Batch Volume meets the ATS, when, in fact, the material does not meet the ATS and requires additional treatment prior to off-Site disposal.

5. Deciding that stockpiled soil or other material is non-hazardous or non-RCRA hazardous waste, when, in fact, the soil is a RCRA hazardous waste that requires treatment or disposal as a RCRA hazardous waste.

6. Deciding that a proposed fill source is acceptable for reuse, when, in fact, the material is unacceptable.

Although sampling design errors cannot be reliably, quantitatively estimated, quality control procedures have been incorporated into the study, as described in Element B5 (Section 4.7) to help detect if sampling design errors have taken place. The analytical results obtained as part of the quality control procedures will enable the calculation of measurement performance criteria for comparison to acceptable limits specified in Section A7.4 of the Site-wide QAPP (Veridian, 2005). The measurement performance criteria will provide indications of the combined sampling and analysis error related to laboratory procedures. Performance criteria outliers will be considered and, in such cases, conservative decisions will be made to avoid false positive errors.

4.2.7 Step 7: Optimize the Design for Obtaining Data

This section identifies measures that will be undertaken to design the sampling process to meet the DQOs in the most cost-effective fashion.

The objective of this project is to implement the DTSC-approved remedial action at the Site and to remove the Organic Residue and other impacted soil and material containing COCs at concentrations greater than Remediation Goals in a cost-effective and timely manner. Specific sampling and analysis protocols to achieve these objectives are described in the SAP (Appendix A).

4.3 ELEMENT B1 - SAMPLING PROCESS DESIGN

The sampling process design is described in the SAP, including sampling locations, frequencies, and analyses (Appendix A).

4.4 ELEMENT B2 - SAMPLING METHODS

No special sampling methods are anticipated for this work. The Contractor or its subconsultant will collect all environmental samples using standard sampling methods described in the standard operating procedures included with the Site-wide QAPP (Veridian, 2005).

4.5 ELEMENT B3 - SAMPLE HANDLING AND CUSTODY

The Contractor or its subconsultant will follow all sample handling and custody protocols described in Element B3 of the Site-wide QAPP (Veridian, 2005).

The Contractor will collect pre-treatment Building 1 Remediation Waste samples and place the samples on hold at the analytical laboratory for possible future analysis. Although these samples may not be analyzed, the Contractor will follow the sample handling and custody protocols described in Element B3 of the Site-wide QAPP for these samples. The Contractor will clearly note on the chain-of-custody, which samples are to be placed on hold. Samples placed on hold will be frozen by the analytical laboratory. The maximum allowable hold time and last possible date that sample analysis may be requested for TCLP lead will be noted by the laboratory on the sample container and the chain-of-custody. If the Client Representative requests analysis of samples placed on hold, the Contractor will instruct the laboratory to perform the testing in writing, e.g., email transmission indicating the sample identification and analyses. All such addition written instructions will become part of the chain-of-custody and will be attached to the original chain-of-custody.

4.6 ELEMENT B4 - ANALYTICAL METHODS

No special analytical methods are anticipated for this work. The samples will be analyzed using standard SW-846 Analytical Methods described in Element B4 of the Site-wide QAPP (Veridian, 2005). The Site-wide QAPP contains acceptable reporting and detection limits for both waste disposal classification purposes, which do not require determination of extremely low-level concentrations, and for other sampling purposes, such as confirmation sidewall sampling and stockpile sampling for reuse of soil on-site, which require low level reporting and detection limits than waste disposal sampling.

4.7 ELEMENT B5 - QUALITY CONTROL

The Contractor or its subconsultant will follow the QA / QC protocols described in Element B5 of the Site-wide QAPP (Veridian, 2005), with the following exceptions for this Site:

1) Filter blanks will be necessary only if the Contractor collects samples of dewatering water, decontamination water, or storm water for discharge or off-Site disposal. The Contractor will collect filter blank samples at the frequency specified in Element B5 of the Site-wide QAPP. Additionally, any specific testing of water by the Contractor as part of any permitted discharge will be sampled and analyzed consistent with such permits.

2) No field duplicate groundwater samples will be necessary as no groundwater samples are anticipated to be collected.

5. OPERATION AND MAINTENANCE PROCEDURES

This section addresses post-remediation monitoring, which consists of groundwater monitoring and inspection of Site cover. These post-remediation monitoring measures will be consistent with the DTSC-approved RAP / RMP.

5.1 GROUNDWATER MONITORING

Once the environmental remediation activities are complete, OBRA will construct three 2-inch diameter groundwater monitoring wells located near the perimeter of the final excavation limits. Two monitoring wells will be located in the assumed down gradient direction of groundwater flow from the Site (i.e., west of the excavation), and one monitoring well will be located in the assumed up gradient direction of the Site, i.e., east of the excavation. The wells will be constructed to monitor groundwater flow from the shallow water-bearing zone. The wells will be constructed with appropriate permits and construction specifications.

OBRA will collect groundwater samples on a quarterly basis for five years after remediation is complete. With DTSC's approval, OBRA may modify the monitoring frequency based on a review of groundwater data according to the RAP / RMP and the Groundwater Monitoring Plan. Groundwater at the Site is permanently restricted for all uses, including, but not limited to, drinking, irrigation, and industrial uses in accordance with the RAP / RMP and associated land use covenant.

5.2 INSPECTION OF SITE COVER

The excavated area will be backfilled with imported fill and Overburden deemed acceptable for reuse in accordance with Section 7.4.2 of the RMP, as clarified in DTSC's letter entitled Soil Reuse, Former Oakland Army Base – Economic Development Conveyance Area, Oakland California, dated 24 December 2004, and COC concentrations in imported fill and Overburden should not exceed remediation goals established in the RAP, land disposal restrictions, and the California hazardous waste criteria. The excavated area will then be paved with a minimum of approximately 2-inches of asphalt, or more as needed for roadways in areas of restored streets. In accordance with the RAP / RMP, OBRA will conduct an annual physical inspection of the Site to confirm the following:

- The Site continues to have an intact and maintained cover, including any asphalt paving, such that underlying soils are not exposed from breaches, gaps, breaks, or depressions.

- Groundwater is not being used for any purpose, as required in the land use covenant.

- All other requirements of the land use covenant and RMP are being honored.

Descriptions of the observed condition of the cover will be noted in annual inspection reports, and any necessary repairs will be performed and documented by OBRA. This information will be included with the required annual certification of compliance completed by OBRA.

6. SCHEDULE

The Contractor was given full notice to proceed for the Former ORP / Building 1 remediation on 28 November 2005, but due to inclement weather, requested time extension to the contract. The contractor plans to complete the remediation by early June 2006.

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